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Dynamic Analysis On Export, FDI and Growth in Indonesia: An Autoregressive Distributed Lag (ARDL) Model

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A B S T R A C T

This study aims to test the export-led-growth (ELG) hypothesis in Indonesia after the implementation of trade liberalization and analyze the relevance of policies that can be taken by the government. The data used in this study is time series data from 1970-2020. The analysis method of this research uses the Autoregressive Distributed Lag (ARDL) model by applying three models. Model 1 shows that in the short term the ELG hypothesis is proven valid but in the long term the ELG hypothesis is invalid in Indonesia. This is reinforced in model 2 in both of short and long term that real GDP is insignificant to real exports. In the long term, model 2 shows that real exports have a positive effect on FDI and vice versa in model 3 that real GDP has no effect on FDI. The implementation of the results illustrates to policy makers that strong economic growth can attract export capabilities in Indonesia, but policies that are based on economic growth have vulnerabilities to global dynamics that can affect export activities and the investment climate in Indonesia, so export market diversification policies need to be implemented to be able to reach a wider market. From the investment side, it is necessary to carry out structural reforms (such as policies, financial systems, and infrastructure development) so that there is certainty for foreign investors to invest in Indonesia.

A B S T R A K

Penelitian ini bertujuan untuk menguji hipotesis export-led-growth (ELG) di Indonesia pasca diterapkannya liberalisasi perdagangan dan menganalisis relevansi kebijakan yang dapat ditempuh oleh pemerintah. Data yang digunakan dalam penelitian ini adalah data time series dari tahun 1970-2020. Metode analisis penelitian ini menggunakan model Autoregressive Distributed Lag (ARDL) dengan menerapkan tiga model. Model 1 menunjukkan bahwa dalam jangka pendek hipotesis ELG terbukti valid namun dalam jangka panjang hipotesis ELG invalid di Indonesia. Hal ini diperkuat pada model 2 baik dalam jangka pendek maupun jangka panjang, bahwa real GDP insignificant terhadap real ekspor. Dalam jangka panjang pada model 2 menunjukkan bahwa real ekspor berpengaruh positif terhadap FDI dan berlaku sebaliknya pada model 3 yaitu real GDP tidak berpengaruh terhadap FDI. Implementasi hasil penelitian memberikan gambaran kepada pemangku kebijakan bahwa pertumbuhan ekonomi yang kuat dapat mengatraksi kemampuan ekspor di Indonesia, namun kebijakan yang bertumpu pada pertumbuhan ekonomi memiliki kerentanan terhadap dinamika global yang dapat berpengaruh terhadap aktivitas ekspor dan iklim investasi di Indonesia, sehingga kebijakan diversifikasi pasar ekspor perlu segera diterapkan untuk dapat menjangkau pasar yang lebih luas. Dari sisi investasi, perlu dilakukan reformasi structural (seperti kebijakan, sistem keuangan, dan pembangunan infrastruktur) agar terdapat kepastian bagi investor asing dalam menanamkan modalnya di Indonesia.

1. INTRODUCTION

Trade liberalization brought a new direction to promote export activities massively to boost economic growth. This activity led to the form of the Export Led Growth (ELG) Hypothesis. In other words, export activities are an essential factor for economic growth. The economist from classical David Ricardo developed a theory that export is an "engine of growth" on international trade. The debate about the determinants of economic growth is a topic that will continue to grow due to the various factors that affect it. Sahin (2016) predicts

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that the ELG hypothesis indirectly affects economic growth but directly affects output through productivity. Saimul & Darmawan (2020) revealed that trade could transfer knowledge and technology to increase productivity and efficiency. Productivity increases through export activities by export activities increase productivity through concentration on superior sectors, export expansion can balance the trade balance, and export activities will deliver benefits to the country through economies of scale.

Indonesia's economic growth accelerated after the 1997 crisis but not with the high export growth. Since 1980, developing countries have paid great attention to the ELG hypothesis, which uses export policies as the backbone of economic growth. Many countries in Asia applied ELG policies as a substitute for import substitution policies. Export growth in Indonesia is mainly supported by export-oriented Foreign Investment (PMA). The export diversification policy by the government is expected that export expansion can support economic growth. From 1970 to 2020, the average export performance was at 26.73 percent of GDP. There is an inverse causality relationship in Figure 1, where export performance reached the highest number at 52.97 percent in 1998, while economic growth was -13.13. In that year, the high export performance was due to the sharp decline of GDP caused by the 1998 crisis. The last decade showed that export performance has decreased due to the slow diversification of destination countries of export products. The trade war affected Indonesia's export destinations to China, America, and Japan, while natural resource commodities still dominate export products with low value-added.

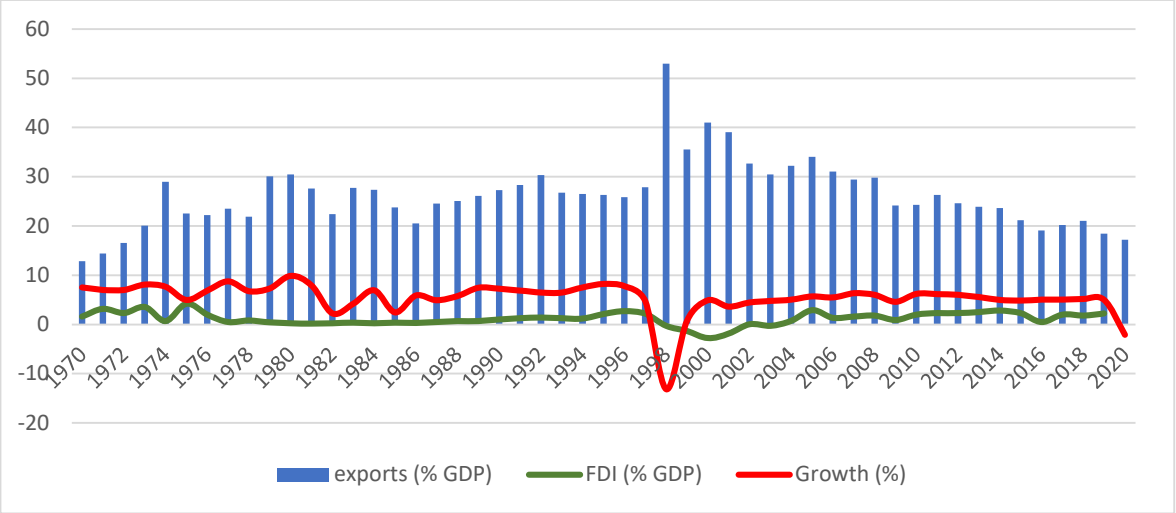


Figure 1. Export, FDI, and eeconomic growth in Indonesia 1970-2020

Figure 1 shows that the average foreign investment (FDI) in Indonesia during 1970-2020 was 1.21 percent of GDP. The number is low compared to the other ASEAN countries. Saleem & Shabbir (2020) identified that FDI and trade openness could increase economic growth. The movement of FDI (% GDP) is in line with the movement of economic growth. The highest FDI occurred in 1975 at 4.24 percent of GDP. In 2014, the FDI, 2.82 percent of GDP, was the highest in the last decade. FDI and exports which during the last one decade had a downward trend. A decline occurred in 2016, where FDI was only 0.49 percent of GDP and exports were 19.09 percent of GDP. Those numbers are the lowest in the last decade.

Many previous researchers have developed research related to the ELG hypothesis. However, it has shown inconclusive conclusions. The research in Indonesia is still limited, as developed using the time-series data approach by Lim & Ho (2013), Ridzuan et al. (2016), and Febiyansah (2017). Lim & Ho (2013) employed two granger causality approaches: linear and nonlinear. Both methods are utilized as the supplementary because when we implement the linear Granger causality approach, there are some possibilities for failure to detect causality effects and are not sufficient to explain the actual relationship between economic growth and exports, so a nonlinear approach is applied. However, the granger causality test approach is limited to seeing the causal relationship between the variables used. Different approaches, such as that carried out by Ridzuan et al. (2016), are limited to the ELG hypothesis with the ARDL approach. The ARDL method has not applied the CUSUM and CUSUM-Q stability tests. The stability test approach

needs to be applied because the ARDL method has different lags for each variable. Febiyansyah (2017) applies two models to FDI-led growth and ELG and does not apply further to the relationship between FDI and exports, where these two variables have an essential contribution to encouraging economic growth in developing countries.

The research gap in this research is to develop a trivariate model to test the ELG, FDI-Led growth, and FDI-Led export hypotheses and apply stability tests to the three models with the CUSUM and CUSUM-Q approaches to obtain an unbiased model. Furthermore, This study aims to test the ELG hypothesis in Indonesia after implementing trade liberalization and the policies relevance that the government can take. This current study contributes to literature such as the application of the dynamic relationship between exports, FDI, and economic growth, the model development on time series data such as the application of the ARDL model to test the stability of the model, the utilization of relevant variables such as gross fixed capital formation, government expenditure, and world uncertainty index (WUI) to see global uncertainty on the ELG and FDI-led growth hypotheses.

2. THEORETICAL FRAMEWORK AND HYPOTHESES

Countries in Asia such as South Korea, Taiwan, Hong Kong, Singapore, Malaysia, Thailand, China, and India moved exports to achieve high economic growth in the past decades. This success stimulates empirical studies to examine the role of exports in increasing economic growth. Empirical studies on testing the ELG hypothesis, especially in Indonesia, found various inconclusive results. Ridzuan et al. (2016) conducted an individual investigation of the validity of the ELG hypothesis in four ASEAN countries. The study employed the ARDL model and utilized independent variables relevant to the determination of the ELG hypothesis, such as labor, capital, and exchange rate. The results showed that the ELG hypothesis in four ASEAN countries (Malaysia, Indonesia, Thailand, and the Philippines) was valid. Specifically, the ELG hypothesis was accepted in Indonesia in the long run and not in the short run. This is in line with Saimul & Darmawan (2020), which identifies a causal relationship between exports to GDP and imports to GDP in Indonesia using the Granger causality approach. It is found that there is a two-way causality relationship between exports to GDP and imports to GDP in the short-run and not long-run.

In contrast, Febiyansah (2017) stated that the proportion of FDI plays a vital role by using the Vector Error Correction Model (VECM) method. Thus, exports and FDI simultaneously boost economic growth in the short run to increase export competitiveness. FDI plays an essential role in supporting export growth in Indonesia. In addition, the absence of the effect of economic growth on FDI and exports shows that Indonesia still has domestic economic problems such as a lack of infrastructure and rigidity in the labor market.

Due to the limitations of ELG hypothesis research in Indonesia and the inconclusive conclusions, research findings from other countries are applied to get the point of view related to the importance of ELG hypothesis research, such as Kalaitzi & Chamberlain (2021) which states that there is no short-run relationship between exports and economic growth in Bahrain. It shows that the research does not support the ELG hypothesis. This is contrary to Sunde (2017) proving that the ELG hypothesis is accepted in South Africa. The research employed the Granger causality test approach, which shows a relationship between exports and economic growth in South Africa. utilized a larger sample and employed panel data techniques in 61 developing countries to show cointegration in the long run between GDP and exports. Raghutla & Chittedi (2020) prove that there is a the long run relationship between exports and economic growth. Thus, export orientation is the best policy strategy to boost economic growth.

Lim & Ho (2013) developed a nonlinearity approach to comprehensively test the ELG. This approach shows a non-linear causality relationship between export growth and economic growth in Thailand and Singapore. It shows that high export will result in high economic growth. However, there is an inverse causality effect where economic growth supports export growth in Malaysia and Indonesia. There is also no causal effect that occurs in the Philippines. Rao et al. (2020) investigated export economic growth and FDI in South-East Asia and South Asia countries. The study revealed that FDI and exports could encourage economic growth in South-East Asia and South Asia countrie. The nonlinearity panel approach shows that only exports have a positive effect on economic growth. The findings support the ELG hypothesis as a strategy to achieve the targetted growth in ASIA countries.

Considering the success of several countries in using exports to increase economic growth, the World Bank recommends that some less developed

countries promote exports as a strategy to increase economic growth and transform into developing countries. Saji (2021) tested the ELG hypothesis in BRICS nations and proved that this model is valid in predicting the economics growth. Furthermore, the inclusion of FDI into the model imptove the predictive power. Marc (2011) employed a two-stage least squared regression structural model approach to estimate the data from 7 south Mediterranean countries (Algeria, Egypt, Jordan, Morocco, Syria, Tunisia, and Turkey) from 1982-2009. The research revealed that human capital and exports were the most influential variables that positively affect economic growth. Furthermore, Ahmad et al. (2018) uses a three-stage procedure as well as co-integration and causality tests on panel data from ASEN5 countries from 1981 to 2013. This study supports the hypothesis of export-led growth (ELG) and FDI-led growth of FDI in the long and short term.

This study tested the ELG hypothesis and developed the FDI-led growth (FLG) hypothesis in Indonesia. FDI plays an essential role in the economy by a). increasing the supply of domestic investment funds can be done through the production chain, where foreign investors buy local products and resell them to several domestic companies; b). can increase export capacity to increase foreign exchange earnings; c). FDI can provide job opportunities widely and increase the application of technology; and d). FDI can increase competitiveness. Tintin (2012) investigated the effect of FDI on economic growth and utilized the freedom index variable as a proxy for institutional quality. The study employed a panel data approach to estimate 125 countries from 1980 to 2010. It showed that FDI stimulates economic growth in both developed and developing countries. Freedom index shows a positive effect on economic growth, which implies that the level of FDI and high quality of institutions play an essential role in increasing economic growth. Tekin (2017) employed the Granger causality approach in a panel of data in 18 least developed countries with several research results: countries with the largest oil reserves support the growth-led exports hypothesis while countries that support the ELG hypothesis export goods (manufactured and services). Another finding that only a few countries support FDI-led growth is that most FDI inflows in the sample countries are small. The ratio of FDI to GDP for two decades shows a low value.

Belloumi (2014) identified a dynamic relationship between trade, FDI, and economic growth in Tunisia using the ARDL approach. The cointegration test results with the Bound test approach show cointegration in the long run when the FDI variable is the dependent variable. The ARDL and Granger causality methods revealed that FDI has a causal relationship with economic growth is not confirmed. This indicates that the FLG hypothesis is invalid in Tunisia. Abbes et al. (2015) employed a Granger causality panel approach in 31 developing countries shows a causal relationship between FDI and GDP in the long run. In addition, Mahembe & Odhiambo (2016) use a dynamic panel approach and show a positive contribution from FDI to economic growth in Southern African Development Community (SADC) countries. The research concludes that countries that attract more FDI can finance more investment instruments and grow faster.

However, research that relies on export activities and FDI to boost economic growth has a significant risk when the global economy experiences a recession. Indonesia experienced a decline in exports and a slowdown in investment growth, leading to decreasing economic growth. Indonesia applies fiscal stimulus policies and monetary easing to maintain purchasing power and reduce the decline of economic growth. This study utilizes the world uncertainty index variable as a proxy for the economic uncertainty variable and fills the gap from previous studies. Currently, research on global uncertainty is an interesting topic. Economic uncertainty can impact uncertain future trends or out-of-reach economic movements (Dellink et al., 2017).

According to the previous literature, there are gaps between the theory and empirical findings related to the importance of export and FDI. Both export and FDI have an important role in boosting economic growth. Thus, the existence of ELG and FDI-Led Growth is acceptable. However, some empirical findings showed the opposite. However, several empirical findings show the opposite result that growth-led exports and the linkage between FDI and exports also play an essential role in technological transformation, increasing productivity and encouraging economic growth. Ahmad et al. (2018) revealed that the different empirical findings are related to the method and the application of different lags. Tang et al. (2015) argue that a stability test is necessary to obtain consistent results.

This approach is considered new, particularly in discussing the co-integration between variables in the interests of long-term analysis, if compared with

the commonly-used cointegration test including Engle-Granger, Maximum likelihood and Johansen-cointegration test. There are several points that make fundamental differences between ARDL and other approaches more noticeable: first, it lies in its flexibility, implying that although the variables have different levels of integration, either $I(0)$, $I(1)$ or mutually cointegrated, this approach can still be used for estimation (Sam et al., 2021). Secondly, ARDL approach is a model that is more statistically significant to determine whether or not the small samples used are co-integrated (Saji, 2021). Finally, in ARDL model it is allowed for each variable to having different number of lags which is considered optimal based on either AIC or SC model criterion (Saleem & Shabbir, 2020). Because there are differences in lag in each variable, the stability test is applied using the CUSUM and CUSUM-Q approaches

3. RESEARCH METHOD

Data sources

This current study utilizes Indonesian annual data on total exports of goods and services, GDP, gross fixed capital formation, foreign direct investment, labor force, GDP deflator from 1970-2020. Those data are generated from the world development indicators of the world bank. The calculation of export data, GDP, and gross fixed capital formation are divided by the GDP deflator (2010=100). FDI utilizes the ratio of FDI to GDP. According to ILO (international labor organization), the labor force is an economically active population, including work and unemployment and the World Uncertainty Index (WUI)* as a proxy for economic uncertainty using Indonesian regional data. All variables except FDI, labor force, and WUI are in dollars.

Unit Root Test

The stationary test is the first step in analyzing time-series data. This study utilizes Augmented Dickey-Fuller (ADF) and Philips-Perron (PP) approaches to conduct a stationarity test. If the ADF statistic value is less than the critical value, then the variable is stationary at I(0) level, but it can be transformed into the first difference form if it is not stationary. A cointegration test can be performed if the variable is stationary at the first difference I(1).

The ARDL approach assumed that the variable could be stationary at I(0) and I(1). If the unit root cannot be transformed into the second difference I(2), this can result in a false regression. Sam et al. (2021) state that if a variable is integrated and stationary at the second difference I(2), the F statistic cannot be interpreted.

ARDL Model and Bound Test Cointegration

Sam et al. (2021) apply the bound test cointegration model to deal with the difference in integration between variables. The cointegration test with the bound test approach is employed to estimate the long-term coefficient with the F-test. The next step, the short-term coefficient estimation of all the variables, can be done along with the estimation of the long-term coefficient by using the model with the error correction format of ARDL. The error correction mechanism (ECM) format can determine the speed of adjustment of the balance direction with the following formula (Sam et al., 2021):

$$\emptyset(L)y_t = a_0 + a_1 t + \beta' x_t + \sum_{i=0}^{q-1} \beta_j^{*\prime} \Delta x_{t-j} - \emptyset^*(L)\,\Delta y_t + \mu_t \quad (1)$$

where $\emptyset(L) = 1 - \sum_{j=1}^{p} \emptyset_j L^j$, dan $\beta(L) = \sum_{j=0}^{q} \beta_j L^j$, y_t is the dependent variable, x_t is an independent variable, and L is *lag operator*. The ARDL model requires an ECM model with the adjustment method and error correction in the short term to get the balance in the long run (Sam et al., 2021). This study develops a trivariate model in the dynamic relationship between economic growth using real GDP, real exports, FDI, and relevant variables such as real gross fixed capital formation, labor force, and economic uncertainty. The trivariate model equation can be written as follows:

$$lnRGDP_t = \alpha_0 + \alpha_1 lnREXS_t + \alpha_2 FDI_t + \alpha_3 lnRGFC_t + \alpha_4 LF_t + \alpha_5 WUI_t + \varepsilon_t \quad (2)$$

$$lnREXS_t = \alpha_0 + \alpha_1 lnRGDP_t + \alpha_2 FDI_t + \alpha_3 lnRGFC_t + \alpha_4 LF_t + \alpha_5 WUI_t + \varepsilon_t \quad (3)$$

$$FDI_t = \alpha_0 + \alpha_1 lnREXS_t + \alpha_2 lnRGDP_t + \alpha_3 lnRGFC_t + \alpha_4 LF_t + \alpha_5 WUI_t + \varepsilon_t \quad (4)$$

where lnRGDP is real gross domestic product; lnREKS is real export of goods and services; lnFDI is foreign direct investment; lnRGFC is a real gross fixed capital formation; and LF is the labor force; and the EU is economic uncertainty; notation (ln) indicates the data is transformed into natural logarithm

(ln); _1, _2, _3, _4, and _5 are coefficient values; _0 constant value; and _t is the error term. Based on Sam et al. (2021), the ARDL error correction model formula is as follows:

$$\Delta lnRGDP_t = \alpha_0 + \sum_{i=1}^{n1} \alpha_1 \Delta lnRGDP_{t-1} + \sum_{i=1}^{n1} \alpha_2 \Delta lnREXS_{t-1} + \sum_{i=1}^{n1} \alpha_3 \Delta FDI_{t-1} + \sum_{i=1}^{n1} \alpha_4 \Delta lnRGFC_{t-1} + \sum_{i=1}^{n1} \alpha_5 \Delta LF_{t-1} + \sum_{i=1}^{n1} \alpha_5 \Delta WUI_{t-1} + \delta_1 lnRGDP_{t-1} + \delta_2 lnREXS_{t-1} + \delta_3 FDI_{t-1} + \delta_4 lnRGFC_{t-1} + \delta_4 LF_{t-1} + \delta_4 WUI_{t-1} + \mu_t \quad (5)$$

$$\Delta lnREXS_t = \alpha_0 + \sum_{i=1}^{n1} \alpha_1 \Delta lnREXS_{t-1} + \sum_{i=1}^{n1} \alpha_2 \Delta lnRGDP_{t-1} + \sum_{i=1}^{n1} \alpha_3 \Delta FDI_{t-1} + \sum_{i=1}^{n1} \alpha_4 \Delta lnRGFC_{t-1} + \sum_{i=1}^{n1} \alpha_5 \Delta LF_{t-1} + \sum_{i=1}^{n1} \alpha_5 \Delta WUI_{t-1} + \delta_1 lnREXS_{t-1} + \delta_2 lnRGDP_{t-1} + \delta_3 FDI_{t-1} + \delta_4 lnRGFC_{t-1} + \delta_4 LF_{t-1} + \delta_4 WUI_{t-1} + \mu_t \quad (6)$$

$$\Delta FDI_t = \alpha_0 + \sum_{i=1}^{n1} \alpha_1 \Delta FDI_{t-1} + \sum_{i=1}^{n1} \alpha_2 \Delta lnRGDP_{t-1} + \sum_{i=1}^{n1} \alpha_3 \Delta lnREXS_{t-1} + \sum_{i=1}^{n1} \alpha_4 \Delta lnRGFC_{t-1} + \sum_{i=1}^{n1} \alpha_5 \Delta LF_{t-1} + \sum_{i=1}^{n1} \alpha_5 \Delta WUI_{t-1} + \delta_1 FDI_{t-1} + \delta_2 lnRGDP_{t-1} + \delta_3 lnREXS + \delta_4 lnRGFC_{t-1} + \delta_4 LF_{t-1} + \delta_4 WUI_{t-1} + \mu_t \quad (7)$$

where parameter _t,i = 1, 2, 3, 4, 5 as long-term multiplier, while function parameter _1,α_2,α_3,α_4,α_5 as short-term coefficient of ARDL model. The cointegration test on the ARDL model is to test the value of F-statistics. The initial hypothesis (null hypothesis) states that there is no cointegration or is described (H0:δ1 = 2 = δ3 = δ4 = 5 = 0), while the alternative hypothesis is that there is cointegration between variables. If there is cointegration, the next step is to estimate the long-run and the short-run adjustment. The CUSUM approach and the CUSUMQ test are applied to the residual value of the model to test the stability of the trivariate model.

4. DATA ANALYSIS AND DISCUSSION

Table 1 is a summary of the descriptive statistics. All variables in the model, such as real domestic product, real exports, foreign direct investment, real gross fixed capital formation, labor force, and world uncertainty index, have a larger mean value than the standard deviation value. It means that all variables in the model have high variability. The skewness value indicates a data distribution. If the skewness value is negative, the data tends to have a slope to the left, whereas if the skewness value is positive, the data tends to tilt to the right. The foreign direct investment, real gross fixed capital formation, and labor force have negative skewness values; thus, the data is skewed to the left. Meanwhile, the real gross domestic product, real exports, and world uncertainty index variables have positive skewness values. It means the data is skewed to the right.

Table 1. Descriptive statistics

Variable	RGDP	REXP	FDI	RGFCF	LF	WUI
Mean	10.447	9.773	1.182	9.868	29.431	0.156
Maximum	11.348	10.695	4.241	10.482	54.010	0.678
Minimum	9.873	9.204	-2.757	9.369	0.000	0.000
Std. Dev.	0.471	0.466	1.320	0.394	24.939	0.142
Skewness	0.218	0.447	-0.383	-0.065	-0.341	1.272
Kurtosis	1.764	2.028	3.749	1.304	1.139	5.370
Jarque-Bera	3.650	3.706	2.435	6.147	8.347	25.692
Observations	51	51	51	51	51	51

Note: Processed Data

The kurtosis value is used to see whether the data is normally distributed or not. If the kurtosis value is at number 3 or around number 3, the data are normally distributed. Furthermore, if the value is above three, the data distribution is at a high peak. Then, if the kurtosis is below three, it means that the data distribution is flat. The variables with a kurtosis value of more than three are the foreign direct investment variable and the world uncertainty index. It means that the data distribution is at a high peak. The other variables that have a kurtosis value below 3 mean that the data distribution is flat. All variables have the same observation value as many as 51.

This study applies the unit root test with Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) approaches to test the presence of non-stationary stochastic in time-series data (Appiah & Korankye, 2019). The unit root test applies "trend and intercept" as a unit root test with "trend" and applies "intercept" as a unit root test with "no trend". Real gross domestic product, real exports, foreign direct investment, real gross fixed capital formation, labor force, and world uncertainty index are stationary at the first difference I(1) based on the unit root test results of the ADF or PP approach. All the model variables produce mixed values in the unit root test at I(0) level. There are stationary variables I(0) such as RGDP, FDI, and WUP, while RGFCF and LF are not stationary at I(0). The unit root test does not apply second difference I(2) because it can produce false regressions. With the unit root test results, the ARDL model can be applied. The results of ADF and PP unit root test are presented in Table 2.

Table 2. Result of ADF and PP unit root test

Variable	ADF		PP	
	Trend	No Trend	Trend	No Trend
			Level	
RGDP	-3.269*(0)	-5.212***(0)	-9.178***(49)	-15.345***(49)
REXP	-1.784(0)	-3.061**(0)	-2.593(49)	-8.041***(49)
FDI	-3.406*(0)	-3.446**(0)	-3.405*(2)	-3.445**(2)
RGFCF	-1.894(0)	-1.536(0)	-1.796(7)	-1.789(16)
LF	-0.437(0)	-1.448(0)	-0.435(1)	-1.448(0)
WUI	-6.287***(0)	-6.211***(0)	-6.287***(0)	-6.211***(0)
			First Difference	
RGDP	-4.808***(0)	-3.704***(0)	-4.987***(1)	-3.990***(2)
REXP	-4.753***(0)	-4.119***(0)	-5.414***(48)	-4.290***(12)
FDI	-9.428***(0)	-9.517***(0)	-9.414***(1)	-9.499***(1)
RGFCF	-6.627***(0)	-6.352***(0)	-7.002***(8)	-6.396***(4)
LF	-5.200***(0)	-5.057***(0)	-5.165***(2)	-5.057***(1)
WUI	-8.549***(2)	-8.635***(2)	-24.171***(16)	-22.673***(16)

Note: The ***, **, and * indicate the statistically significant level at 1%, 5%, and 10%, respectively. The value in parentheses ( ) representing automatic lag length was selected by using Schwarz In-formation Criterion (SIC) for ADF, whilst the PP test values were obtained by automatic bandwidth, selected on Newey-West method using Bartlett Kernel.

A cointegration test with a bound test approach is employed to get the balance of a model in the long run. This study uses a bound test on the developed trivariate model. Model 1 (Eqn 5) is constructed to test the existence of the ELG hypothesis in Indonesia, where RGDP is the dependent variable. Model 2 (eqn 6) is constructed to test whether the GLE hypothesis is appropriate with REXP as the dependent variable. Model 3 (eqn 7) tests whether FLG or GLF exist in Indonesia, with FDI as the dependent variable. The developed trivariate model will produce different lag lengths based on the Schwarz Bayesian Criterion (SBC).

Table 3. Cointegration Bound tests analysis

F-Statistics	%	Lower Bound I(0)	Upper Bound I(1)
		Model 1 (3,1,0,3,0,1)	
7.604***	90%	2.259	3.264
	95%	2.67	3.781
	99%	3.593	4.981
		Model 2 (1,0,2,3,1,0)	
7.421***	90%	2.226	3.241
	95%	2.617	3.743
	99%	3.543	4.839
		Model 3 (1,3,0,4,0,1)	
7.081***	90%	2.259	3.264
	95%	2.67	3.781
	99%	3.593	4.981

Note: The ***, **, and * indicate the statistically significant level at 1%, 5% and 10% respectively. The value in parentheses ( ) representing automatic lag length was selected by using Schwarz Information Criterion (SIC).

The existence of equilibrium in the long term of the trivariate model was tested using the Bound cointegration test approach. Table 3 shows that each model has a different lag length, as in model 1 it has a lag length (3,1,0,3,0,1), model 2 (1,0,2,3,1,0) and model 2 (1,0,2,3,1,0) 3 (1,3,0,4,0,1) based on the Schwarz Information Criterion (SIC). The results of the Bound test of the three models have higher F-statistics values, the critical values of the upper and lower limits. Thus, the overall model is balance in the long run.

Table 4 shows the results of the diagnostic test that consist of serial correlation AR (1) Breusch-Godfrey approach, functional form Reset (1), normality test, and heteroscedasticity ARCH (1). Diagnostic tests are employed to measure the feasibility of the model explicitly built. The normality test employs the Jarque-Bera approach, and the results show that the trivariate model has a normal distribution of residual values. In general, the diagnostic test results show that the trivariate model produces good scores because there are no problems in the diagnostic test with a probability value of > 5%.

Table 4. Diagnostic tests analysis

Diagnostic Test	Model 1 (*p*-value)	Model 2 (*p*-value)	Model 3 (*p*-value)
Normality	0.482	0.948	0.779
Serial Correlation	0.653	0.339	0.108
Heteroskedasticity	0.399	0.989	0.706
Functional Form	0.384	0.326	0.425

Note: The ***, **, and * indicate the statistically significant level at 1%, 5% and 10% respectively.

GDP is the dependent variable in model 1 in table 5. The purpose of the model 1 equation is to test the existence of the ELG and FLG hypotheses in Indonesia. The long-term estimation shows that the real export variable does not affect real GDP with a probability value of > 5%. The results of long-term estimation showed that the ELG hypothesis in Indonesia is invalid. This study supports the research of Reppas and Christopou-los (2005). The determinants of ELG hypothesis invalidity in Indonesia are due to several factors such as worsening trade requirements, inefficient product demand, market size in developed countries that are not large enough to absorb Indonesian exports, and the instability of world markets that significantly affect Indo-nesia's export conditions.

Table 5. Result of long-run coefficient.

Variable	Model 1 Coefficient (t-statistics)	Model 2 Coefficient (t-statistics)	Model 3 Coefficient (t-statistics)
C	3.599	-0.766	5.718
	(2.065)**	(-0.777)	(1.087)
Ln(RGDP)	-	1.477	-3.335
		(9.657)***	(-1.627)
Ln(REXP)	0.022	-	2.253
	(0.090)		(1.863)*
FDI	-0.078	0.088	-
	(-2.221)**	(3.206)***	
Ln(RGFCF)	0.879	-0.553	1.092
	(4.535)***	(-3.285)***	(0.825)
LF	-0.003	0.004	0.014
	(-1.609)	(2.081)**	(1.575)
WUI	-0.587	0.234	-2.893
	(-1.612)	(1.217)	(-2.062)**

Note: The ***, **, and * indicate the statistically significant level 1%, 5% and 10% respectively. All variables transform to logarithm except labor force, real foreign direct investment, and world uncertainty index.

The effect of the FDI variable shows a negative coefficient value both in long-run and short-run, which means that an increase in FDI will decrease real GDP. Contrasting with research by Mahembe & Odhiambo (2016), FDI has a positive contribution to economic growth in eastern ASIA countries. It happens because of the maximum FDI ratio. Parlinggoman (2017) concludes that the way FDI affects and contributes to economic growth depends on economic conditions and technology. This finding supports Belloumi (2014), which stated that FDI does not have a causal relationship to growth in Tunisia. The results are also in line with Munir & Ameer (2020) which stated that FDI negatively affects economic growth due to misallocation of resources and some distortions in trade, prices, and other factors that can interrupt FDI performance and economic growth. Yalta (2013) argues that FDI has a negative effect on economic growth because it tends to reduce domestic investment and unstable FDI inflows. The real gross fixed capital formation has a positive effect on real GDP in Indonesia. An increase in capital formation will increase the real GDP in Indonesia.

Model 2 utilizes the real export as the dependent variable to test whether the GLE hypothesis is valid compared to the ELG hypothesis in Indonesia. The results show that the GLE hypothesis is valid. It can be seen that the real GDP variable affects real exports. Ahmad et al. (2018) argued that when exports stimulate output expansion (ELG hypothesis), output expansion can increase exports (GLE hypothesis) at the same time. This can happen when the national economy can increase its production capacity. Increased production capacity can occur through input growth and increasing productivity. Thus, skills can be diversified through labor division and new technologies that can lead to efficiency, increased competitiveness, and increased production-based exports.

The FDI variable has a positive effect on real exports. An increase in FDI inflows will increase exports. Model 3 shows that real exports have a positive effect on FDI. This is in line with Belloumi (2014)), which revealed a causal relationship between FDI and exports. Belloumi (2014) argues that FDI plays an important role in the economy through: a). Increase the supply of domestic investment funds. This can be done through the production chain, where foreign investors buy the local product and resell them to several domestic companies; b). can increase export capacity to increase foreign exchange earnings; c). FDI can provide job opportunities widely and increase the application of technology; and D). FDI can increase competitiveness. The labor force has a positive effect on real exports. This shows that an increase in the labor force will increase real exports. The export expansion will increase demand for labor and increase productivity.

Table 6. Result of short-run coefficient and error correction model

Variable	Model 1 (3,1,0,3,0,1) Coefficient (t-statistics)	Model 2 (1,0,2,3,1,0) Coefficient (t-statistics)	Model 3 (1,3,0,4,0,1) Coefficient (t-statistics)
ΔLnRGDP	-	0.570	-5.030
		(4.872)***	(-2.034)**
ΔLnRGDP(-1)	-0.360	-	-9.310
	(-3.264)***		(-3.649)***
ΔLnRGDP(-2)	-0.221	-	-3.315
	(-2.275)**		(-1.483)
ΔLnREXP	0.222	-	2.037
	(4.153)***		(1.667)
ΔLnREXP(-1)	-	-0.386	-
		(-5.246)***	
ΔFDI	-0.013	0.004	-
	(-2.340)**	(0.472)	
ΔFDI(-1)	-	-0.012	-0.904
		(-2.019)*	(-6.399)***
ΔLnRGFCF	0.669	-0.018	5.929
	(18.771)***	(-0.128)	(3.195)***
ΔLnRGFCF(-1)	0.093	0.350	7.957
	(1.185)	(5.397)***	(3.809)***
ΔLnRGFCF(-2)	0.253	-0.086	4.194
	(3.640)***	(-1.739)*	(2.391)**
ΔLnRGFCF(-3)	-	-	1.840
			(2.430)**
ΔLF	-0.001	0.001	0.013
	(-1.628)	(0.586)	(1.649)
ΔWUI	-0.028	0.090	-0.852
	(-1.212)	(1.229)	(-1.442)
ECM	-0.169	-0.386	- 0.904
	(-7.880)***	(-7.756)***	(-7.620)***

Note: The ***, **, and * indicate the statistically significant level 1%, 5% and 10% respectively.

Another finding showed an inconclusive conclusion between the FLG and GLF hypotheses. The finding is revealed in model 3 that real GDP does not affect FDI. Thus, there is no two-way relationship between FDI to real GDP and real GDP to FDI. In line with Belloumi's research (2014), FDI does not have a causal relationship to growth in Tunisia. Economic uncertainty has a negative effect on FDI. It shows that when conditions of uncertainty increase, foreign investment will decrease. The FDI volatility caused by increased uncertainty can weaken the integration of foreign companies with the destination country. In that way, investors prefer to hold their investment in countries with high uncertainty because they have a high risk.

If we look at the coefficient values both the short and long term, there are consistent negative relationship between FDI to GDP and GDP to FDI, the result shows the role of FDI in Indonesia very small in affected to the domestic economy, recorded for the last 10 years the average of FDI in Indonesia around 3% and not been able to encourage economic growth. Control variables gross fixed capital formation consistently have a positive effect on GDP both in the short and long term and have a positive effect on FDI only in the short term, means an increase in capital accumulation can encourage GDP and FDI levels. Another control variabel such as labor force and uncertainty variables consistent there is no effect on model 1, 2 and 3 both in long term and short term. For the uncertainty variables despite the probability value has a negative coefficient on model 1 and 2, means an increase uncertainty have negative effect on GDP and FDI.

The short-run results in Table 6 conclude that: In the long run, this study does not support the ELG hypothesis. However, there is a positive effect of the real export variable on real GDP in the short run. Furthermore, if there is a deviation or error in the short term, it will be corrected in the long term (Habibullah et al., 2012). Both error correction term values are significant at the 5% level and have a negative coefficient value. Third, the coefficient value of the error correction term has implications for the

speed of adjustment to regain its balance in the long run. The trivariate model shows different levels of speed of adjustment. The error correction term value is 0.17, 0.39, and 0.90 for models 1, 2, and 3, respectively, which indicates that if an error or deviation occurs in the short term, it will be corrected for 5.9 years for models 1, 2.6 years for model 2, and 1.1 years for model 3 to regain balance in the long run. In the ARDL model, CUSUM and CUSUMQ were applied to test the stability of the trivariate model. The results of the CUSUM and CUSUMQ tests (see appendix) show that the trivariate model shows stable parameters.

5. CONCLUSION, IMPLICATION, SUGGESTION, AND LIMITATIONS

This study aims to test whether the ELG hypothesis or the GLE hypothesis is valid in Indonesia. This study also aims to develop the FLG or GLF hypothesis by adding relevant variables to the model, such as gross fixed capital formation and labor force. The study also utilizes the uncertainty variable to observe its effect on real GDP, real exports, and FDI in Indonesia. There are differences in the results between the short and long term for model 1. The result shows that the ELG hypothesis is valid in Indonesia in the short term. However, parameter deviations can be corrected in the short term and get a balance in the long term. In the long term, it shows that the ELG hypothesis is invalid in Indonesia. This result is showed in model 2 both in the short and long term, that real GDP is insignificant to real exports.

In the long run, it shows that real exports positively affect FDI in model 2 and vice versa in model 3. The study shows inconclusive conclusions on the FLG hypothesis and the GLF hypothesis. Model 1 showed that FDI has a negative effect on real GDP, and in model 3, real GDP has no effect on FDI. The labor force variable has a positive effect on exports in model 2. The economic growth uncertainty can decline the foreign investors' interest in investing in Indonesia. It is confirmed by model 3 that WUI has a negative effect on FDI. In the short term, it shows that the trivariate model has different error correction term values. The error correction term value in model 1, 2, 3 is 0.17, 0.39, and 0.90 respectively. It indicates that if an error or deviation oc-curs in the short term, it will be corrected for 5.9 years for model 1, 2.6 years for model 2, and 1.1 years for model 3 to regain balance in the long run. The overall model is stable based on the results of the CUSUM and CUSUMQ tests.

The implementation of the research results demonstrates to the policymakers that strong economic growth can attract export capabilities in Indonesia. However, the economic growth-based policy has vulnerabilities to global dynamics that can affect export activities and the investment climate in Indonesia. Thus, policy Export market diversification needs to be implemented immediately to reach a broader market. From the investment side, it is necessary to construct structural reforms (such as policies, financial systems, and infrastructure development) to attract foreign investors. FDI can increase productivity and accelerate techno-logical change for the host country.

REFERENCES

Abbes, S. M., Mostéfa, B., Seghir, G., & Zakarya, G. Y. (2015). Causal interactions between FDI, and economic growth: evidence from dynamic panel co-integration. *Procedia Economics and Finance*, 23, 276-290.

Ahmad, F., Draz, M. U., & Yang, S. C. (2018). Causality nexus of exports, FDI and economic growth of the ASEAN5 economies: evidence from panel data analysis. *The Journal of International Trade & Economic Development*, *27*(6), 685-700.

Appiah, M., Li, F., & Korankye, B. (2019). Foreign investment & growth in emerging economies: panel ARDL analysis. *Journal of Economics, Business, & Accountancy Ventura*, *22*(2), 274-282.

Belloumi, M. (2014). The relationship between trade, FDI and economic growth in Tunisia: an application of the autoregressive distributed lag model. *Economic System*, (38), 269–287.

Dellink, R., Chateau, J., Lanzi, E., & Magné, B. (2017). Long-term economic growth projections in the Shared Socioeconomic Pathways. *Global Environmental Change*, *42*, 200-214.

Febiyansah, P. T. (2017). Indonesia's FDI – exports – GDPgrowth nexus: Trade or investment - driven? *Buletin Ekonomi Moneter Dan Perbankan*, *19*(4), 469–488.

Habibullah, M. S., Din, B. H., & Abdullah, H. (2012). Boder effects: the cases for states of Northen Malaysia and provinces of Southern Thailand. *Journal of International Economic Review*, *5*(1), 15–27.

Kalaitzi, A. S., & Chamberlain, T. W. (2021). The validity of the export-led growth hypothesis: some evidence from the GCC. *The Journal of International Trade & Economic Development*, *30*(2), 224-245.

Lim, S. Y., & Ho, C. M. (2013). Nonlinearity in

ASEAN-5 export-led growth model: Empirical evidence from nonparametric approach. *Economic Modelling*, *32*(1), 136–145.

Mahembe, E. E., & Odhiambo, N. M. (2016). Does foreign direct investment cause economic growth? A dynamic panel data analysis for SADC countries. *International Journal of Emerging Markets*, *11*(3), 316-332

Marc, A. (2011). Is foreign direct invesment a cure for economic growth in developing countries? structural model estimation applied to the case of the south shore Mediterranean countries. *Journal of International Business and Economics*, *11*(4), 32-51.

Munir, K., & Ameer, A. (2020). Nonlinear effect of FDI, economic growth, and industrialization on environmental quality: Evidence from Pakistan. M*anagement of Environmental Quality: An International Journal*, 31(1), 223-234.

Parlinggoman, M. E. D. J. (2017). The Role of High-Tech Exports and of Foreign Direct Investments (FDI) on Economic Growth. *European Research Studies Journal*, *20*(4A), 194-212.

Raghutla, C., & Chittedi, K. R. (2020). Is there an export-or import-led growth in emerging countries? A case of BRICS countries. *Journal of Public Affairs*, *20*(3), e2074.

Rao, D. T., Sethi, N., Dash, D. P., & Bhujabal, P. (2020). Foreign aid, FDI and economic growth in South-East Asia and South Asia. *Global Business Review*, 0972150919890957.

Ridzuan, A. R., Mohd Noor, A. H., & Ahmed, E. M. (2016). ASEAN4 prospective of export-led economic growth. *Journal of Business Management and Economics*, *7*(1), 001–012.

Sahin, D. (2016). The export-led growth: a case study of China. *The Journal of International Social Research*, *9*(40), 1653–1657.

Saimul, S., & Darmawan, A. (2020). Understanding causality relation among FDI, foreign trade and economic growth. *Economics Development Analysis Journal*, *9*(4), 414–426.

Saji, T. G. (2021). Integration effects in exports induced economic growth: evidence from extended ELG model in BRICS. *International Journal of Trade and Global Markets*, *14*(3), 304-324.

Saleem, H., & Shabbir, M. S. (2020). The short-run and long-run dynamics among FDI, trade openness and economic growth: using a bootstrap ARDL test for co-integration in selected South Asian countries. S*outh Asian Journal of Business Studies*, 9(2), 279-295.

Sam, C. Y., McNown, R., & Goh, S. K. (2019). An augmented autoregressive distributed lag bounds test for cointegration. Economic Modelling, 80, 130-141

Sunde, T. (2017). Foreign direct investment, exports and economic growth: ADRL and causality analysis for South Africa. *Research in International Business and Finance*, *41*, 434–444.

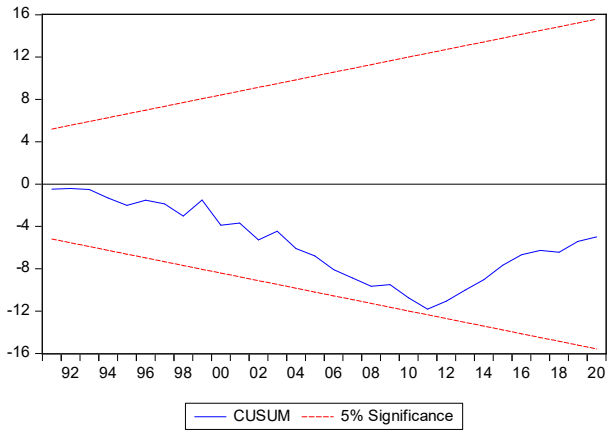
Tang, C. F., Lai, Y. W., & Ozturk, I. (2015). How stable is the export-led growth hypothesis? Evidence from Asia's four little dragons. *Economic Modelling*, *44*, 229–235.

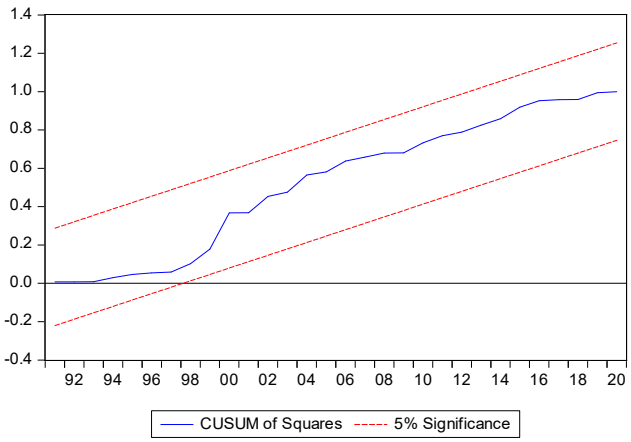
Tekin, R. B. (2012). Economic growth, exports and foreign direct investment in Least Developed Countries: A panel Granger causality analysis. *Economic Modelling*, *29*(3), 868–878.

Tintin, C. (2017). Does foreign direct invest spur economic growth and development? a comparative study. *Physical Education and Sport for Children and Youth with Special Needs Researches – Best Practices – Situation*, 1–53.

Yalta, A. Y. (2013). Revisiting the FDI-led growth Hypothesis: The case of China. *Economic Modelling*, *31*(1), 335–343.

APPENDICES





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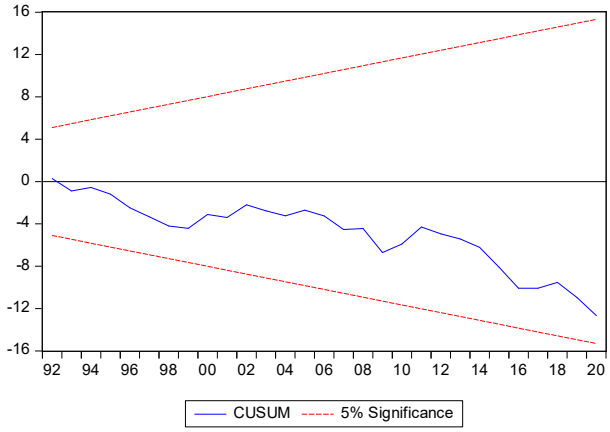

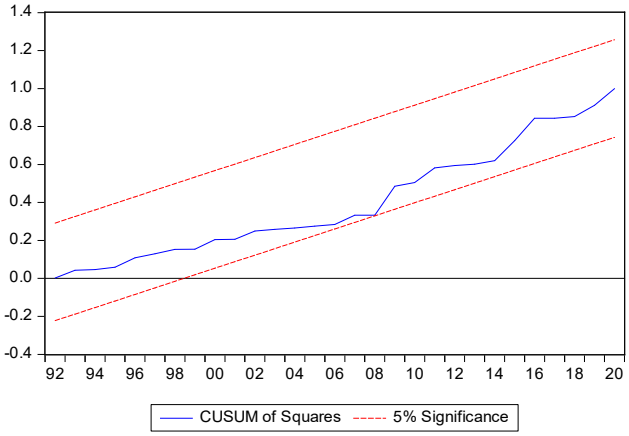

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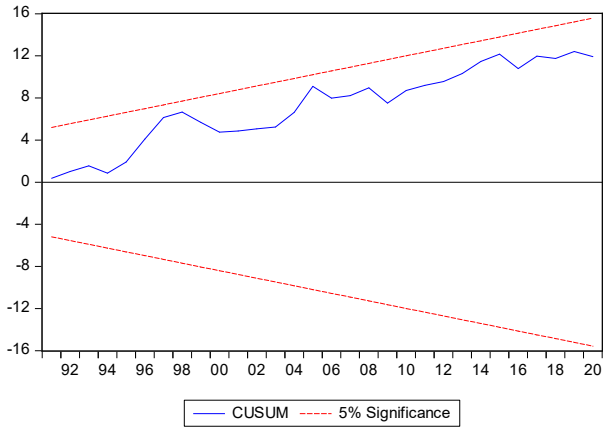

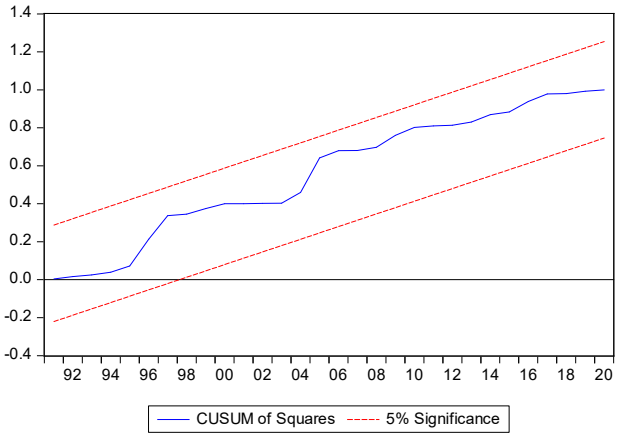

MODEL 3